Generative artificial intelligence: a systematic review and applications

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Abstract

In recent years, the study of artificial intelligence (AI) has undergone a paradigm shift. This has been propelled by the groundbreaking capabilities of generative models both in supervised and unsupervised learning scenarios. Generative AI has shown state-of-the-art performance in solving perplexing real-world conundrums in fields such as image translation, medical diagnostics, textual imagery fusion, natural language processing, and beyond. This paper documents the systematic review and analysis of recent advancements and techniques in Generative AI with a detailed discussion of their applications including application-specific models. Indeed, the major impact that generative AI has made to date, has been in language generation with the development of large language models, in the field of image translation and several other interdisciplinary applications of generative AI. Moreover, the primary contribution of this paper lies in its coherent synthesis of the latest advancements in these areas, seamlessly weaving together contemporary breakthroughs in the field. Particularly, how it shares an exploration of the future trajectory for generative AI. In conclusion, the paper ends with a discussion of Responsible AI principles, and the necessary ethical considerations for the sustainability and growth of these generative models.